Methane policy update

Baseline and outlook for G20 countries

17 April 2018

Methane Policy Update: Context

- Policy discussions, if not yet laws and regulations, reflect the sense that more purposeful action must to be taken to address methane emissions
  - > After a period of stability, global methane concentrations in the atmosphere have risen almost 5% over the last decade
  - > Methane's higher global warming potential amplifies impact
  - > Recognition that traditional focus on CO_2 insufficient to achieve Paris Agreement goals
- The scale of natural methane emissions is very large —~40%— and often lies beyond direct political influence
- Energy industries are a smaller contributor to global methane emissions than natural sources and agriculture but there is potential for reductions in energy industries
- The Nationally Determined Contributions (NDCs) from the world's largest economies —the G20—that are the basis of the Paris Agreement vary greatly in the extent to which they consider methane

Climate policy trends are mixed across the world's largest emitting economies

- The Climate Policy Index (CPI) is a tool developed by IHS Markit to benchmark the relative stringency of climate policies
  - > The primary purpose of the CPI is to help conventional energy operators gauge their exposure to carbon constraints, by country, taking into account national and international circumstances
- The Paris Agreement entry into force in November 2016 and related translation of NDC submissions into national policy has lifted all scores
- G20 climate policy stringency tends to sit above world averages but recent assessment reflects softening of climate policy impacts upon the conventional energy sectors, including oil and gas, in some markets
- Score decreases result from changes in quantitative metrics, including higher emissions, political developments and underlying weakness in policy and enforcement foundations

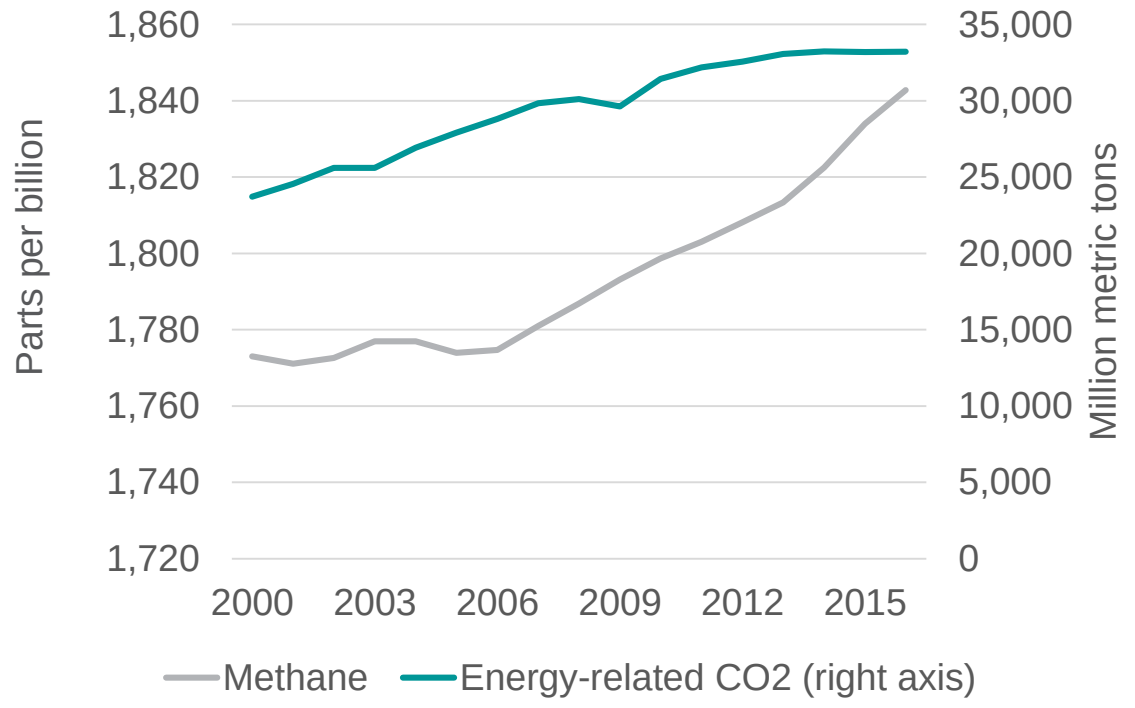
IHS Markit Climate Policy Index scores for G20

	2017	2016	2015	2017 % change vs. 2016
Indonesia	1.86	1.71	1.6	9%
South Korea	3.38	3.25	2.65	4%
Saudi Arabia	1.94	1.88	1.51	3%
France	3.64	3.54	3.41	3%
Japan	3.59	3.51	3.15	2%
Canada	2.97	2.94	2.68	1%
India	2.46	2.44	2.23	1%
Mexico	2.64	2.62	2.44	1%
Australia	3.29	3.32	3.14	-1%
China	3.02	3.05	2.77	-1%
EU	3.39	3.42	3.23	-1%
Germany	3.71	3.76	3.57	-1%
Italy	3.26	3.29	3.16	-1%
South Africa	2.59	2.63	2.31	-1%
Turkey	1.89	1.91	1.67	-1%
Brazil	2.62	2.68	2.41	-2%
Russia	2.6	2.64	2.47	-2%
United Kingdom	3.69	3.85	3.75	-4%
Argentina	1.41	1.48	1.31	-5%
United States	2.83	3	2.79	-6%
G20 average	**2.84**	**2.85**	**2.61**	**-0.4%**
World average	**2.05**	**2.02**	**1.86**	**2%**

Methane policy discussions driven largely by recent upturn in atmospheric concentrations

- Global CO_2 emission growth trends have been moderated by a combination of political and economic factors
  - > Plateau in global CO_2 between 2013-17 linked more to Chinese steel sector activity and less to climate policy impacts
- Same 2013-17 period saw an increase in atmospheric GHG concentrations
- Rising global methane concentrations since 2007 attributed with atmospheric trend
  - > Long-term historic average annual increase of 0.5 parts per billion (ppb) recently outstripped by an order of magnitude (e.g.10 times more)
- Rises attributed to increases in microbial sources from natural wetlands and rice paddies as well as fossil fuel emissions
  - > There has been a surge in the former and an improvement in data on the latter

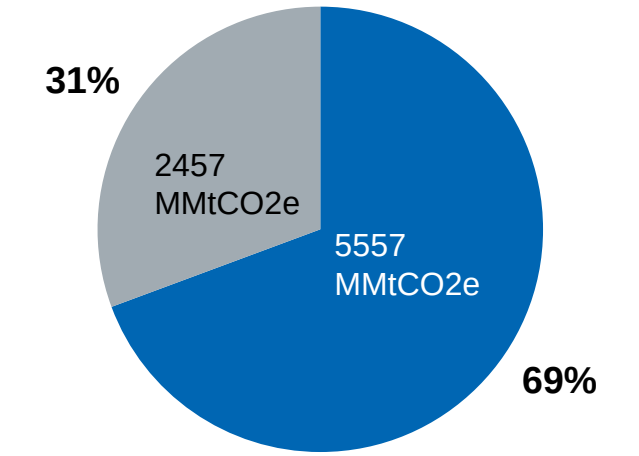
Global GHG trends



Source: IHS Markit, NOAA

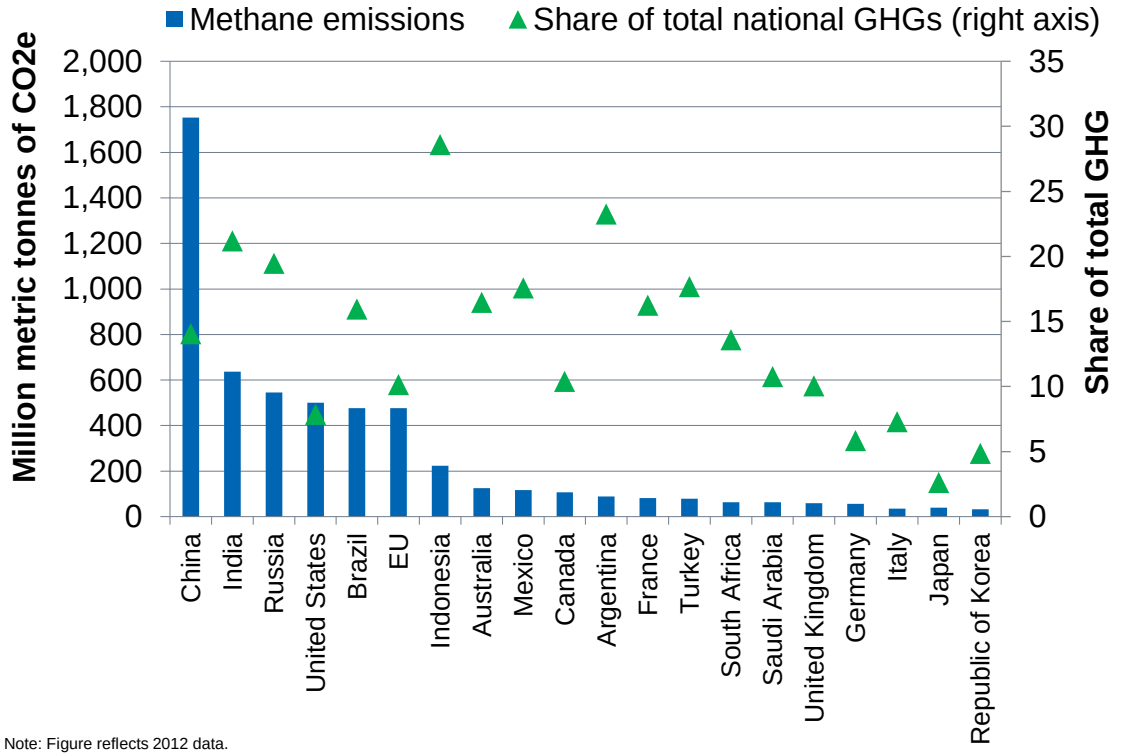
G20 countries emitted roughly 70% of observed global methane and in some cases methane is an important piece of the national GHG profile

Sources of methane emissions



Note: Figure reflects 2012 data. MMtCO2e = million metric tons of carbon dioxide equivalent.
Source: IHS Markit, IEA, World Bank

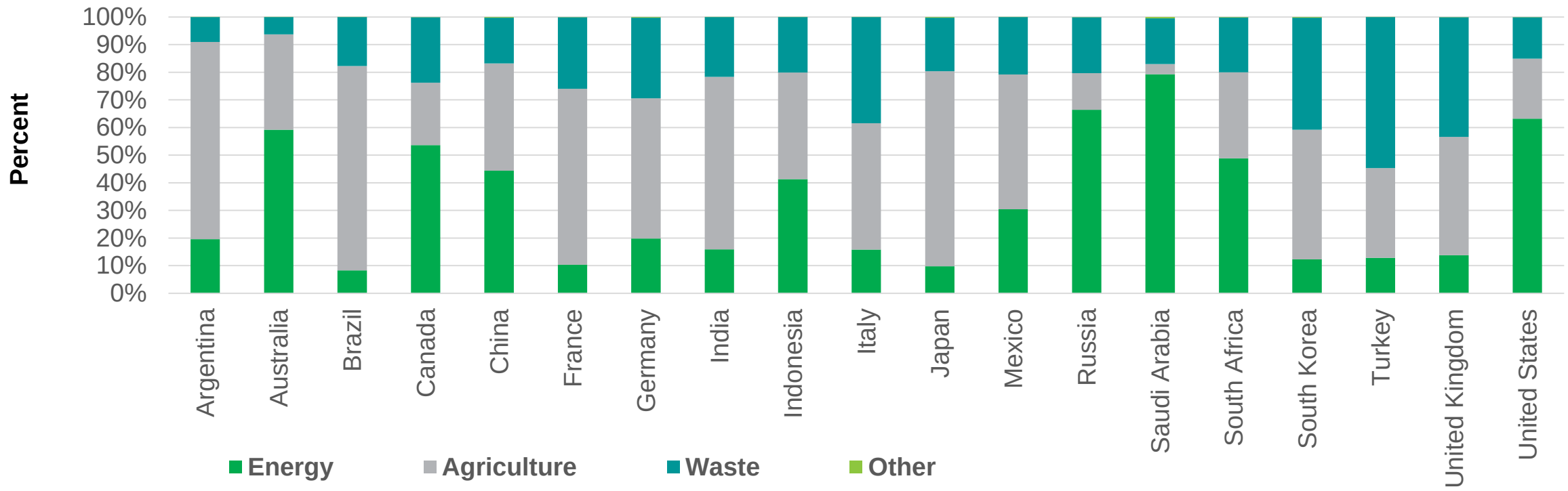
G20 methane emissions



Note: Figure reflects 2012 data.
Source: IHS Markit, IEA, World Bank

Identifying the main sources of man-made methane is the first step in building an appropriate policy response

Shares of G20 anthropogenic methane emissions by source

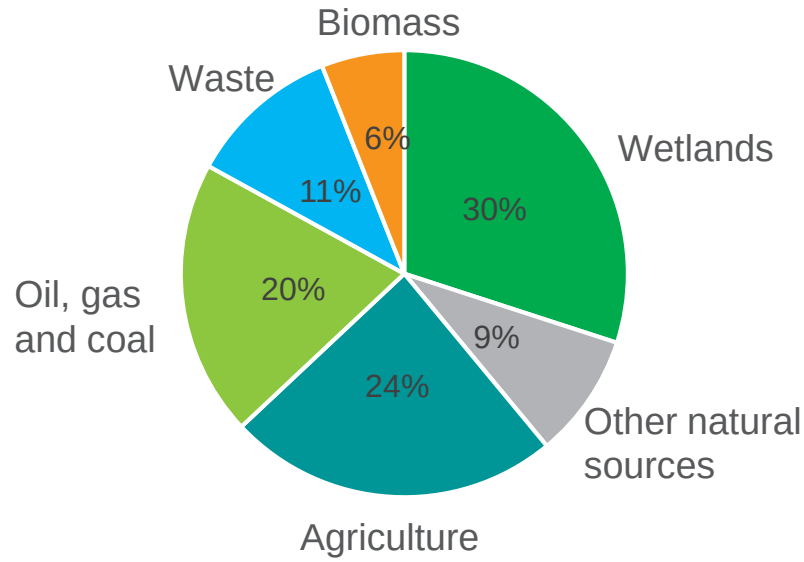


Notes: Figure is based on the latest global methane emissions sector level data from 2012
Source: IHS Markit, EDGAR

G20 climate policy effectiveness faces a number of clear obstacles when it comes to methane

- Naturally occurring methane emissions account for around 40% of global totals
  - > Few policies are prioritising action in these areas
- Agriculture is the largest man-made source of methane emissions
  - > Scale and importance, and disparate spread, of rice cultivation and cattle farming implies it will be difficult to have any major impact on methane emissions
  - > Technological advances in types of feed (for cattle) and in genetic make-up (for rice) can reduce the methane-intensity of agriculture
  - > The promotion and development of these technologies in Australia, Italy, Japan and South Korea is rightly the focus of policy in this area

Sources of methane emissions

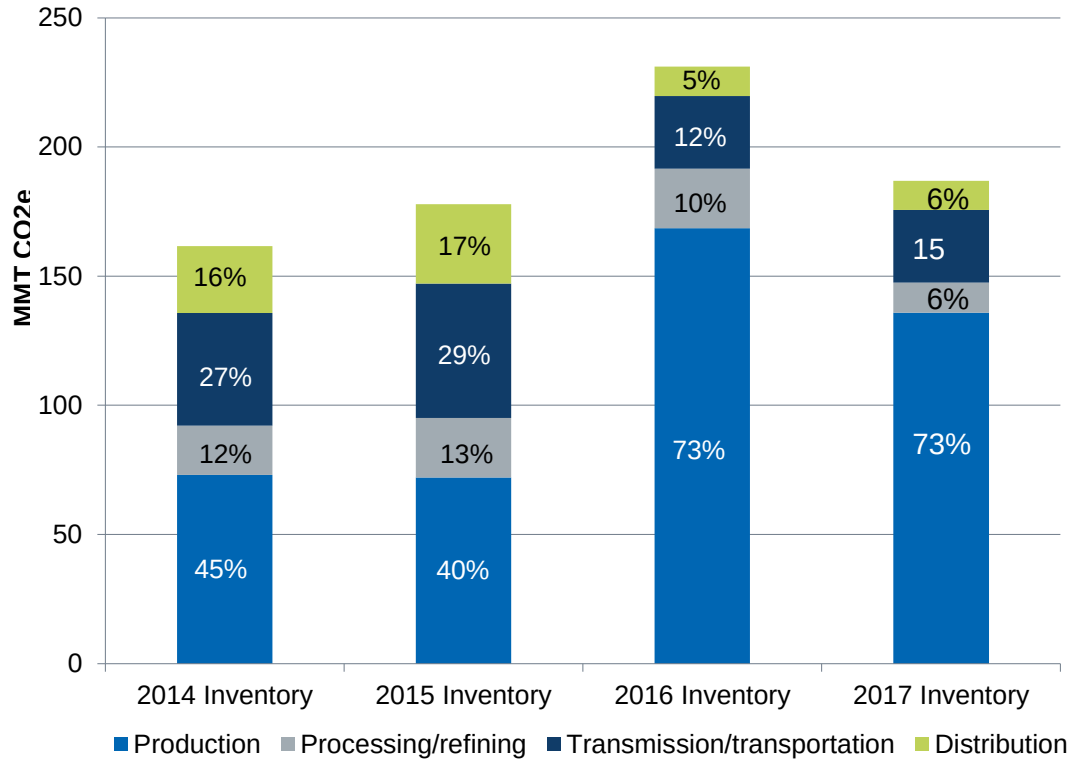


Notes: Figure is based on the latest global methane emissions sector level data from 2012. Biomass includles liquid and solid methanogens.
Source: IHS Markit, IEA

Energy-related methane an emerging focus

- Within the global fossil fuel segment, the latest data indicates oil and gas activities emit around 80 million metric tons of carbon dioxide equivalent (MtCO2e) and coal roughly 40 MtCO2e
- Coal mine methane capture and use is a key focus in some markets (Australia, China and the United States)
- Upstream activities are associated with ~80% of all methane emissions from oil and gas operations
  - > Emissions inventories are highly contingent on methodologies and methane estimates from oil and gas systems have changed significantly in some cases (see United States example)
  - > A range of plans requiring the implementation of technologies to limit fugitive emissions and leaks, venting, pneumatic devices, compressors, etc. are in place or under development —but tend to move slowly
- Where there is no direct methane reduction policy in place, policies that indirectly reduce methane emissions— renewable portfolio incentives, transport fuel standards, tax incentives for energy efficiency, and improved landfill and waste management—are playing a role in improving methane intensity

Estimated methane emissions from oil and gas systems in the United States, 2012



Notes: The date of the Inventory refers to the year the data were published.
Reported emissions for past years are revised with each new Inventory.
Source: IHS, US EPA

G20 NDCs highlight variety of approaches to methane in climate policy targets

Explicit methane emissions reduction target:

- **Canada**: As part of its target to reduce national GHG emissions 30% below 2005 levels by 2030, Canada aims to reduce methane emissions from the oil and gas sector, including offshore activities, by 40- 45 percent by 2025.
- **Japan**: Japan aims to reduce GHG emissions 25.4% below 2005 levels and has set a specific methane target calling for a 18.8% reduction compared to 2005 levels (approximately 31.6 million tCO2e).

Reference to methane emissions reduction activities:

- **China**: China aims to achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak early, while also committing to control methane emissions from rice fields; to intensify the recovery and utilization of methane from landfills; to enhance coal-bed methane recovery.
- **Indonesia**: Indonesia has set unconditional GHG emissions reduction target, including methane, of 29% below the business as usual scenario by 2030; pulp and paper and palm oil industries to implement methane capture and utilization strategies.
- **Saudi Arabia**: The actions and plans outlined by Saudi Arabia seek to achieve mitigation co-benefits ambitions of up to 130 million tons of CO2eq avoided by 2030 annually through contributions to economic diversification and adaptation, including actions taken to conserve, recover and reuse hydrocarbon resources and minimize flaring and fugitive emissions.
- **Turkey**: Up to 21 percent reduction in GHG emissions from the business as usual level by 2030, including through recovery of methane from landfill gas from managed and unmanaged landfill sites.
- **United States**: The United States intends to achieve an economy-wide target of reducing its greenhouse gas emissions by 26%-28% below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%. Under the Clean Air Act, the United States Environmental Protection Agency is developing standards to address methane emissions from landfills and the oil and gas sector.

G20 NDCs highlight variety of approaches to methane in climate policy targets (2)

Implicit methane emissions reduction target:

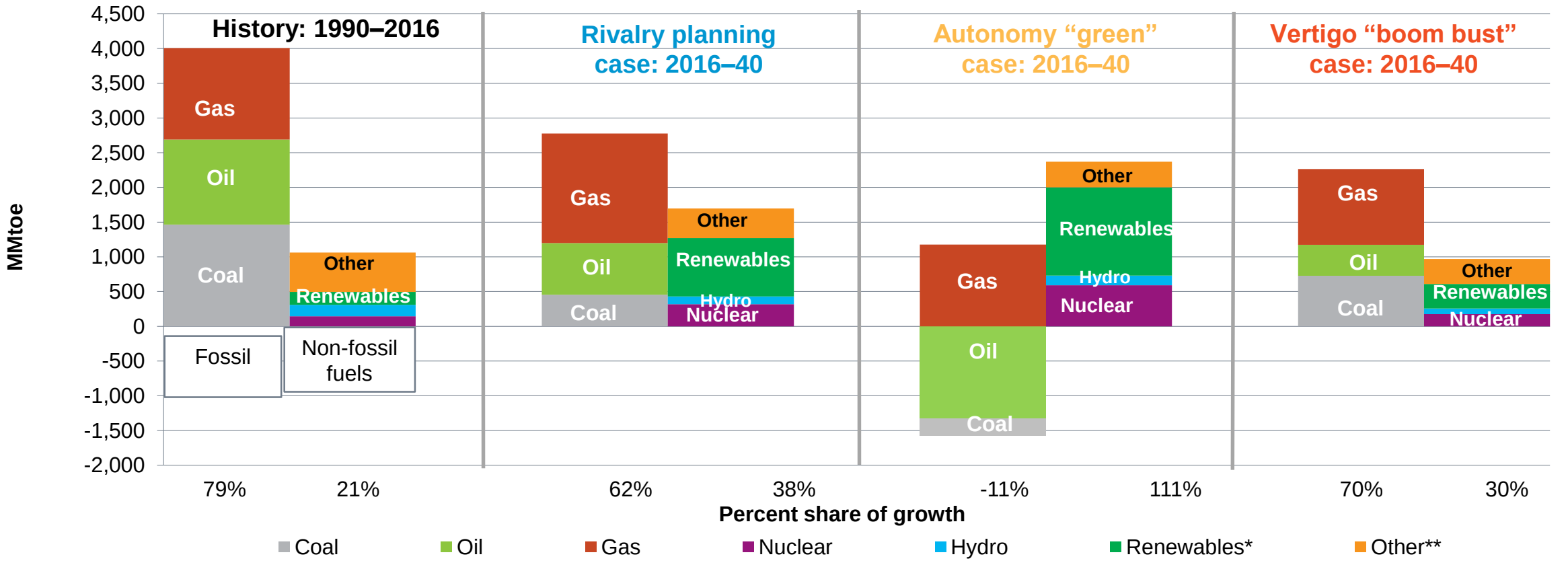
- **Argentina**: Argentina's GHG emissions not to exceed 483 million tCO2eq net by the year 2030.
- **Australia**: Australia's GHG emissions to be reduced 26% to 28% below 2005 levels by 2030.
- **Brazil:** Brazil aims for emissions levels equivalent to reductions of 37% below 2005 levels in 2025 and 43% below 2005 in 2030.
- **EU**: The EU and its Member States are committed to a binding target of an at least 40% domestic reduction in greenhouse gas emissions, including methane, by 2030 compared to 1990, to be fulfilled jointly.
- **Mexico**: Mexico is committed to reduce unconditionally 25% of its GHGs and short lived climate pollutants below the business as usual by 2030. This commitment implies a reduction of 22% of GHG, including methane.
- **Russia**: Limiting anthropogenic greenhouse gases in Russia, including methane, to 70-75% of 1990 levels by the year 2030 might be a long-term indicator, subject to the maximum possible account of absorbing capacity of forests.
- **South Africa**: South Africa GHG emissions to peak by 2025, plateau for a decade and then decline.
- **South Korea**: Republic of Korea to reduce GHG emissions, including methane, by 37% from the business as usual level by 2030.

No reference to methane:

- **India**: India commits to reduce emissions intensity (CO2 per unit of GDP) between 33% and 35% below 2005 levels by 2030.

Greater focus on methane in climate policy unlikely to impact longer-term global energy demand growth trends

Primary energy demand growth by IHS Markit global energy scenario



Note: Renewables include solar, wind, geothermal, tide/wave/ocean energy; Other includes biofuels, solid waste, biomass, net trade of electricity and heat. MMtoe = million metric tons of oil equivalent.
Source: IHS Markit

Methane Policy Update: Outlook

- Naturally occurring methane sets the tone for steady emissions
- Microbial methane surges linked to wetlands and agriculture pose a clear challenge for G20 emissions reduction strategies
  - > Not at the forefront of policy design or politically sensitive in a way that points to loose regulation
- Government multilateral engagements can provide greater support for the dissemination of best practices in agriculture and energy
  - > 18 of the G20 are partners in the Global Methane Initiative
- Energy sector an important, if not central, focus for G20 methane reduction efforts
  - > Energy industry leading activities on methane — often in the face of shareholder pressure—need further policy support
    - – Oil producers could reduce or eliminate venting or flare associated gas as an alternative to venting
    - – Gas producers can target distribution network refurbishment and improved methane management during routine maintenance programs
    - – Oil and gas producers can both make better use of innovative LDAR techniques, especially in super-emitters
    - – Coal producers can take action to more closely monitor and manage fugitive emissions
  - > Public authorities can foster still greater private sector engagement engagment
- Recent increases in methane concentrations underscore the importance of robust data and a more balanced approach to GHGs to serve Paris Agreement ambitions

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